(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
28 June 2001 (28.06.2001)

PCT

(10) International Publication Number
WO 01/46006 A2

(51) International Patent Classification[7]: B63B 59/06, 59/04, A46D 1/00, C09D 5/16 // B24D 13/10

(21) International Application Number: PCT/BE00/00148

(22) International Filing Date:
15 December 2000 (15.12.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09900824 21 December 1999 (21.12.1999) BE

(71) Applicant and
(72) Inventor: VAN ROMPAY, Boudewijn, Gabriël [BE/BE]; Hensbergelei 17, B-2930 Brasschaat (BE).

(74) Agent: DONNÉ, Eddy; Bureau M.F.J. Bockstael nv, Arenbergstraat 13, B-2000 Antwerpen (BE).

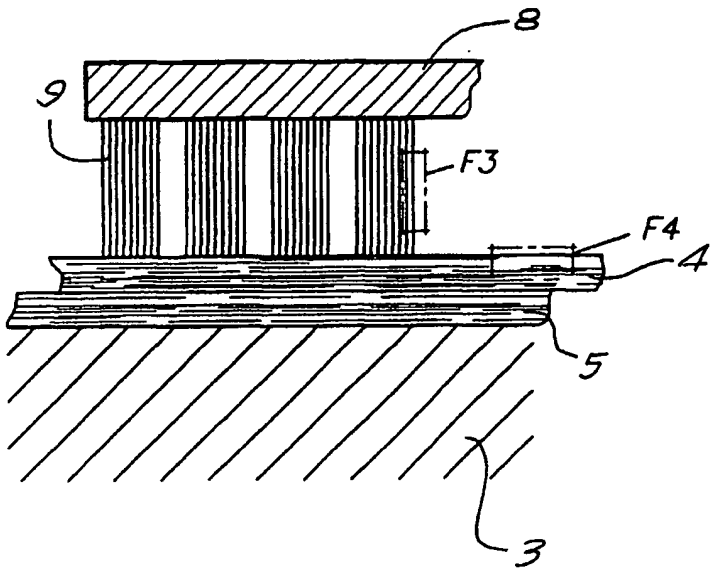
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *Without international search report and to be republished upon receipt of that report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR PROTECTING UNDERWATER SURFACES AGAINST POLLUTION DUE TO FOULING, AND BRUSH AND COATING AGENT USED THEREWITH



(57) Abstract: The invention relates to a method for protecting an underwater surface (3) against pollution due to fouling, in particular a metal surface, upon which a coating (4) is applied, whereby the coating (4), in the presence of water, is brushed or polished smooth with at least one brush (8) having bristles (9) made of synthetic material in which a grinding agent (10) is embedded. In the coating (4), glass flakes (5) are embedded to which silver is bonded.

WO 01/46006 A2

Method for protecting underwater surfaces against pollution due to fouling, and brush and coating agent used therewith.

This invention relates to a method for protecting underwater surfaces, in particular metal surfaces, against pollution due to fouling.

It is known that surfaces which generally or regularly are situated under water, in particular, parts of the hulls of ships and such, are rapidly polluted due to fouling by organisms present in the water, such as algae or other beings living in water, such as, for example, crustaceae.

Such pollution by biological growth on the hull of a ship below the water level increases the weight of the ship and increases the friction in the water, as a result of which the energy consumption for navigating is increased.

Cleaning these surfaces is time-consuming and expensive.

Therefore, attempts are made to prevent the pollution due to fouling, and to this aim a coating, a so-called anti-fouling coating, is applied to the surface.

This coating may consist of one or more layers of paint to which a chemical biocide has been added.

These biocides, however, gradually are released into the water and are very harmful for the water fauna and flora. In most cases, they are also agressive in respect to the metal of the ship's hull.

Moreover, such layers of paint regularly have to be

renewed, which has to be performed in a dry dock and is relatively expensive.

Other known coatings consist of one or more layers of a synthetic material, for example, polyester, to which glass flakes are possibly added for reinforcement.

Although by the coating consisting of synthetic material the pollution is strongly reduced, this pollution, anyhow, still takes place rather fast.

The invention aims at a method for protecting underwater surfaces against pollution due to fouling which offers a better protection than the aforementioned known methods.

According to the invention, this aim is achieved in that a covering layer, this is a paint or a so-called coating, for example, based upon synthetic material, which is applied to the surface, is brushed or polished smooth, in the presence of water, with at least one brush having bristles made of synthetic material into which a grinding agent is embedded.

This method utilizes the observation that, the smoother the surface, the slower the pollution due to fouling under water is taking place. By brushing or polishing, a very smooth surface can be obtained.

The brushing or polishing may take place under water or aground, however, in this last case during brushing or polishing, water has to be provided on the brushed surface.

Preferably, the brushing or polishing is performed by means of a brush with bristles in which aluminium oxide or silicium carbide particles are embedded.

The bristles of the brush can be manufactured of a supple synthetic material, such as nylon, polyethylene, polyester and similar.

In the coating, preferably glass particles, so-called "glass flakes", are provided.

An additional protection against pollution due to fouling then can be obtained by brushing or polishing a coating in which glass flakes are provided to which a non-toxic agent against micro-organisms is bonded.

It was noted that the micro-pollution is strongly counteracted by means of the agent against micro-organisms.

The coating can be provided in at least two layers, whereby at least in the outermost layer these glass flakes, with a non-toxic agent against micro-organisms bonded thereto, are applied.

For a non-toxic agent against micro-organisms, preferably metals with such properties are applied, in particular silver.

A coating with glass flakes, to which silver is bonded, can also decelerate the pollution of the underwater surface due to fouling without brushing or polishing; however, by brushing or polishing, glass flakes are being brought to the exterior side of the surface and therefore also silver will be brought to the exterior side of the surface.

The invention also relates to a brush which is particularly suitable for applying the method according to the invention, described heretofore, and whereby the

characterizing feature thereof consists in that a grinding agent is embedded into its bristles.

The invention also relates to a coating agent for coating an underwater surface which counteracts pollution due to fouling of this surface and which comprises a settable liquid, the characterizing feature of which consists in that the liquid comprises glass flakes to which a non-toxic agent against micro-organisms, in particular silver, is bonded.

With the intention of better showing the characteristics of the invention, hereafter, as an example without any limitative character, several preferred forms of embodiments of a method for protecting underwater surfaces against pollution due to fouling and of a brush and a coating agent used therewith, according to the invention, are described with reference to the accompanying drawings, wherein:

figure 1 represents a lateral view of a portion of the hull of a ship during the application of the method according to the invention;
figure 2, at a larger scale, represents a cross-section according to line II-II in figure 1;
figures 3 and 4, at a still larger scale, represent the portions indicated by F3, F4, respectively, in figure 2.

In figure 1, a portion of the steel hull 1 of a ship is represented.

The entire hull 1 of the ship or in any case the portion thereof situated below the lowest floating line 2 which is permanently under water and therefore forms an underwater surface 3, and preferably the portion situated

at least below the highest floating line 2A, is coated with a coating 4.

As represented in detail in figure 4, this coating 4 consists of synthetic material in which glass flakes 5 are embedded, to which silver or a similar non-toxic agent against micro-organisms decelerating the growth of these micro-organisms or killing these micro-organisms is bonded.

A suitable synthetic material is polyester or vinyl polyester.

The coating 4 or covering can be formed by applying a liquid settable coating agent consisting of a matrix 6 based on non-polymerized synthetic material which sets due to polymerisation and in which the glass flakes 5 are distributed.

The application may take place by means of a brush, a roll or a spraying gun.

This coating 4 can be applied in a single layer of, for example, 1 mm, but preferably is applied in two layers of approximately 0,5 mm, as represented in the drawings.

The glass flakes 5 have a maximum dimension of approximately 0,4 mm. Their thickness is such that throughout the thickness of the coating 4, approximately 150 layers of glass flakes 5 are present.

The glass flakes 5 provide for that the coating 4 is impermeable to water, whereas the synthetic matrix 6 itself is permeable.

A non-toxic agent against micro-organisms can be bonded

to the glass flakes 5.

The glass flakes 5 may be impregnated with this agent against micro-organisms or, as represented in figure 4, be covered with a thin layer 7 of this agent.

The agent against micro-organisms preferably is a metal, and a particularly suitable agent in this respect is silver.

The coating 4, which is applied aground, for example, in a dry dock, is smoothened in a subsequent step by brushing or polishing under water, as represented in figure 2.

In a variant, this brushing or polishing takes place aground; however, during brushing or polishing water is provided at the surface which is brushed or polished. In this variant, the brushing or polishing can be performed in a dry dock, for example, immediately after the setting of the coating 4.

In both forms of embodiment, the brushing or polishing takes place by means of a brush 8, whereby the bristles 9 thereof, which are arranged in bundles, are made of supple synthetic material in which, however, a grinding agent 10 is embedded, such as represented in figure 3.

This brush 8 can be moved mechanically, for example, rotated by means of a motor.

Suitable synthetic materials for the bristles 9 are, amongst others, nylon, polyethylene and polyester.

Suitable grinding agents 10 are, amongst others, aluminium oxide, and carborundum or siliciumcarbide,

particles of which are embedded in the synthetic material of the bristles 9.

The method described in the aforegoing protects the underwater surface 3 against biological fouling, which is strongly decelerated.

On one hand, the brushing or polishing with the brush 8 described in the aforegoing provides for an extremely smooth surface, as a result of which a mechanical protection against growth is obtained.

On the other hand, the agent against micro-organisms on the glass flakes 5 counteracts the micro-pollution in that spores and other micro-organisms will not settle on the underwater surface 3.

Especially, the combination is efficient, whereby then the brushing or polishing not only smoothens the underwater surface 3, but moreover provides for that glass flakes 5 and, therefore, agent against micro-organisms, become exposed on the exterior surface of the underwater surface 3, such that this agent can render its full effect.

The invention is in no way limited to the forms of embodiment described heretofore and represented in the figures, on the contrary may such method, brush and coating agent be realized in different variants without leaving the scope of the invention.

Claims.

1.- Method for protecting an underwater surface (3) against pollution due to fouling, in particular a metal surface, upon which a coating (4) is applied, characterized in that the coating (4), in the presence of water, is brushed or polished smooth with at least one brush (8) having bristles (9) of synthetic material in which a grinding agent (10) is embedded.

2.- Method according to claim 1, characterized in that a coating (4) based on synthetic material is applied.

3.- Method according to claim 1 or 2, characterized in that the brushing or polishing is performed under water.

4.- Method according to claim 1 or 2, characterized in that the brushing or polishing is performed aground, but that during brushing or polishing water is applied on the brushed or polished surface.

5.- Method according to any of the preceding claims, characterized in that the brushing or polishing is performed with a brush (8) with bristles (9) in which aluminium oxide or silicium carbide particles are embedded.

6.- Method according to claim 4 or 5, characterized in that the brushing or polishing is performed with a brush (8), the bristles of which are manufactured of supple synthetic material, such as, amongst others, nylon, polyethylene, polyester and similar.

7.- Method according to any of the preceding claims, characterized in that glass flakes (5) are provided in

the coating (4).

8.- Method according to claim 7, characterized in that a coating (4) is brushed or polished, in which glass flakes (5) are provided to which a non-toxic agent against micro-organisms is bonded.

9.- Method according to claim 8, characterized in that the coating (4) is applied in at least two layers, whereby at least in the outermost layer, glass flakes (5) are present, with a non-toxic agent against micro-organisms bonded thereto.

10.- Method according to claim 9 or 10, characterized in that, as a non-toxic agent against micro-organisms, a metal is used which decelerates the growth of micro-organisms and/or kills these latter.

11.- Method according to claim 12, characterized in that silver is bonded to the glass flakes (5) as an agent against micro-organisms.

12.- Method according to claim 11, characterized in that the silver covers the glass flakes (5) as a silver layer (7).

13.- Method for protecting underwater surfaces against pollution due to fouling, in particular metal surfaces, upon which a coating (4) is applied, characterized in that a coating (4) is applied with therein glass flakes (5) to which a non-toxic agent against micro-organisms is bonded.

14.- Method according to claim 13, characterized in that a coating (4) is applied with therein glass flakes (5) to which silver is bonded.

15.- Brush for applying the method according to any of the claims 1 to 12, characterized in that in its bristles (9), a grinding agent (10) is integrated.

16.- Coating agent for coating an underwater surface (3) which counteracts pollution due to fouling of this surface, which agent at least partially consists of a settable liquid, characterized in that the liquid comprises glass flakes (5) to which a non-toxic agent against micro-organisms is bonded.

17.- Coating agent according to claim 16, characterized in that the liquid comprises glass flakes (5) to which silver is bonded.

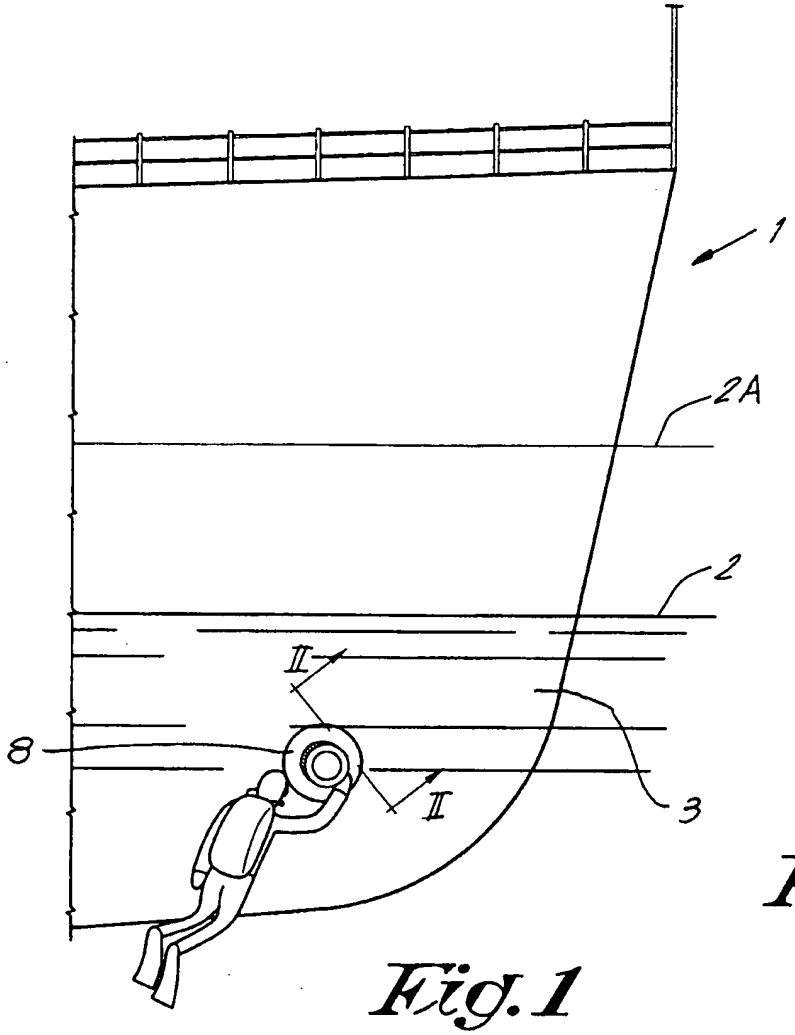


Fig.1

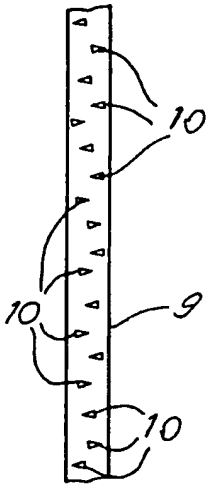


Fig.3

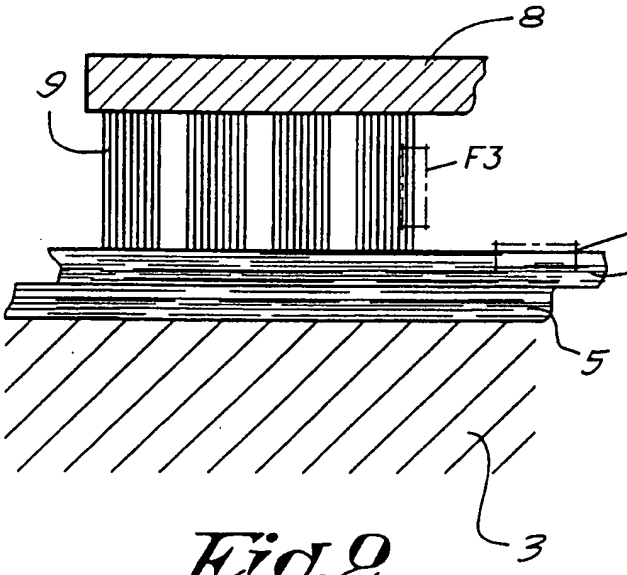


Fig.2

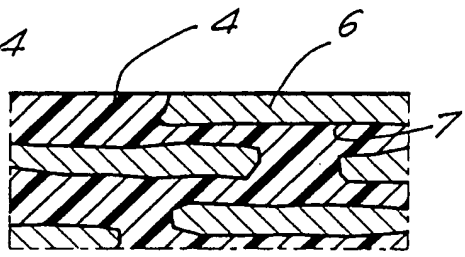


Fig.4